

NEOTROPICAL MONOGENEA. 14. REVISION OF
CALLORHYNCHOCOTYLE SURIANO AND INCORVAIA,
1982 (HEXABOTHRIIDAE) WITH THE
DESCRIPTION OF *C. AMATOI*

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Abstract. — The generic diagnosis of *Callorhynchocotyle* Suriano & Incorvaia, 1982, is emended based on new information obtained from specimens of the type species, *C. marplatensis*, collected from *Callorhinchus callorhynchus* from the coasts of Uruguay and Argentina. *Callorhynchocotyle marplatensis* is re-described; *Squalonchocotyle callorhynchi* is re-described and transferred to *Callorhynchocotyle*; and *C. amato*i is proposed for hexabothriids reported previously from *Callorhinchus milii* by Manter (1955) and Dillon & Hargis (1968).

All known Hexabothriidae are parasitic on gills of elasmobranch or holocephalan fishes (Class Chondrichthyes). Approximately 60 species are described from elasmobranchs; two are known from holocephalans. Manter (1955) described *Squalonchocotyle callorhynchi* from the holocephalans, *Callorhinchus capensis* Dumeril and *C. milii* Bory, from marine waters off South Africa and New Zealand, respectively. Dillon & Hargis (1968) re-described this species as *Erpocotyle callorhynchi* (Manter, 1955) Yamaguti, 1963, based on specimens from *C. milii* in New Zealand waters. Lebedev & Parukhin (1969) reported the parasite under the latter name from *C. capensis* in Wallfish Bay (southwestern Africa); and in 1970, Kuznetsova recorded *S. callorhynchi* from *Callorhinchus antarcticus* Fleming (= *C. callorhynchus*) from the Patagonian Shelf off South America. Suriano and Incorvaia (1982) proposed *Callorhynchocotyle* (Hexabothriidae) for their new species, *C. marplatensis*, from *Callorhinchus callorhynchus* (Linnaeus) off Argentina (38°S, 57°W). In the present study, *Callorhynchocotyle* Suriano & Incorvaia, 1982, is revised; *C. marplatensis* is re-described; *S. callorhynchi* is re-described and transferred to *Callorhynchocotyle*; and *C. amato*i, n. sp., is proposed for hexabothriids re-

ported from *Callorhinchus milii* by Manter (1955) and Dillon & Hargis (1968).

Materials and Methods

Hosts (*Callorhinchus callorhynchus*) were collected by trawl off the coasts of Uruguay and Argentina during May 1985 and June 1986. Methods of parasite collection, preparation, measurement, and illustration are as described by Kritsky et al. (1986). Measurements are in micrometers; averages are followed by ranges in parentheses. Measurements of curved structures represent straight-line distances between extreme points; see Fig. 4 for those obtained from each sclerite. Vouchers (specimens collected during the present study) are deposited in helminthological collections of the National Museum of Natural History (USNM), which is housed at the USDA in Beltsville, Maryland; the University of Nebraska State Museum (HWML), Lincoln, Nebraska; the Fundação Instituto Oswaldo Cruz (FIOC), Rio de Janeiro, Brazil; and the Museo de La Plata (MP), La Plata, Argentina.

Callorhynchocotyle Suriano & Incorvaia, 1982

Emended diagnosis. — Hexabothriidae. Body elongate. Tegument thin, smooth.

Caeca confluent in peduncle posterior to testes. Testes numerous, irregular; vas deferens sinuous, surrounded by small gland cells along most of its length, with small loop proximal to entrance into cirrus. Cirrus comprising two parts: distal part ovate, bulbous; proximal part a thick-walled nonexpanded tube. Genital pore at level of gut bifurcation. Ovary lobate anteriorly, coiled posteriorly; oviduct originating from posterior end of ovary; seminal receptacle sac-like, reduced; ootype smooth; uterus dorsal to ovary, ventral to vas deferens. Vagina parallel, comprising two portions; distal portion glandular, proximal portion delicate. Vaginal pores on ventral surface about midway between body midline and lateral margin on each side of cirrus. Vitellaria comprising 2 bilateral bands extending from level of vaginal pores into peduncle; vitelline commissure, genitointestinal canal dorsal to ovary. Eggs with two polar filaments, forming continuous chain by united filaments. Excretory pores marginal at level of genital pore. Haptor asymmetrical; with 2 small, 4 large sucker-sclerite complexes; small complexes lying on same side of longitudinal axis of haptor; appendix originating from dorsal haptoral surface lateral to body midline, armed with 2 anchors, 2 terminal suckers. Parasites of *Callorhynchidae*.

Type species.—*Callorhynchocotyle marplatensis* Suriano and Incorvaia, 1982, from *Callorhynchus callorhynchus*.

Other species.—*Callorhynchocotyle callorhynchi* (Manter, 1955), n. comb., from *Callorhynchus capensis*; *Callorhynchocotyle amatoi*, n. sp., from *Callorhynchus milii*.

Callorhynchocotyle marplatensis

Suriano & Incorvaia, 1982

Figs. 1–9, 10a, 11a, 12a

Synonyms.—*Callorhynchocotyle callorhynchi* Suriano & Incorvaia, 1982; *C. callorhynchy* Suriano & Incorvaia, 1982.

Host.—*Callorhynchus callorhynchus* (Linnaeus).

Distributions.—Coasts of Uruguay, Argentina (holotype).

Specimens studied.—Holotype, MP 12; 17 vouchers, USNM 80279, HWML 20705, 20706, FIOC 32.442, MP 1613 D.

Description (measurements in Table 1).—Weak genital sucker, 94–110 testes. Papillae lacking on rim and inner wall of oral, haptoral suckers. Sucker sclerite 2, 3 with elongate point, evenly curved shaft and point. Anchor with wide base, short roots, medially curved shaft, short point.

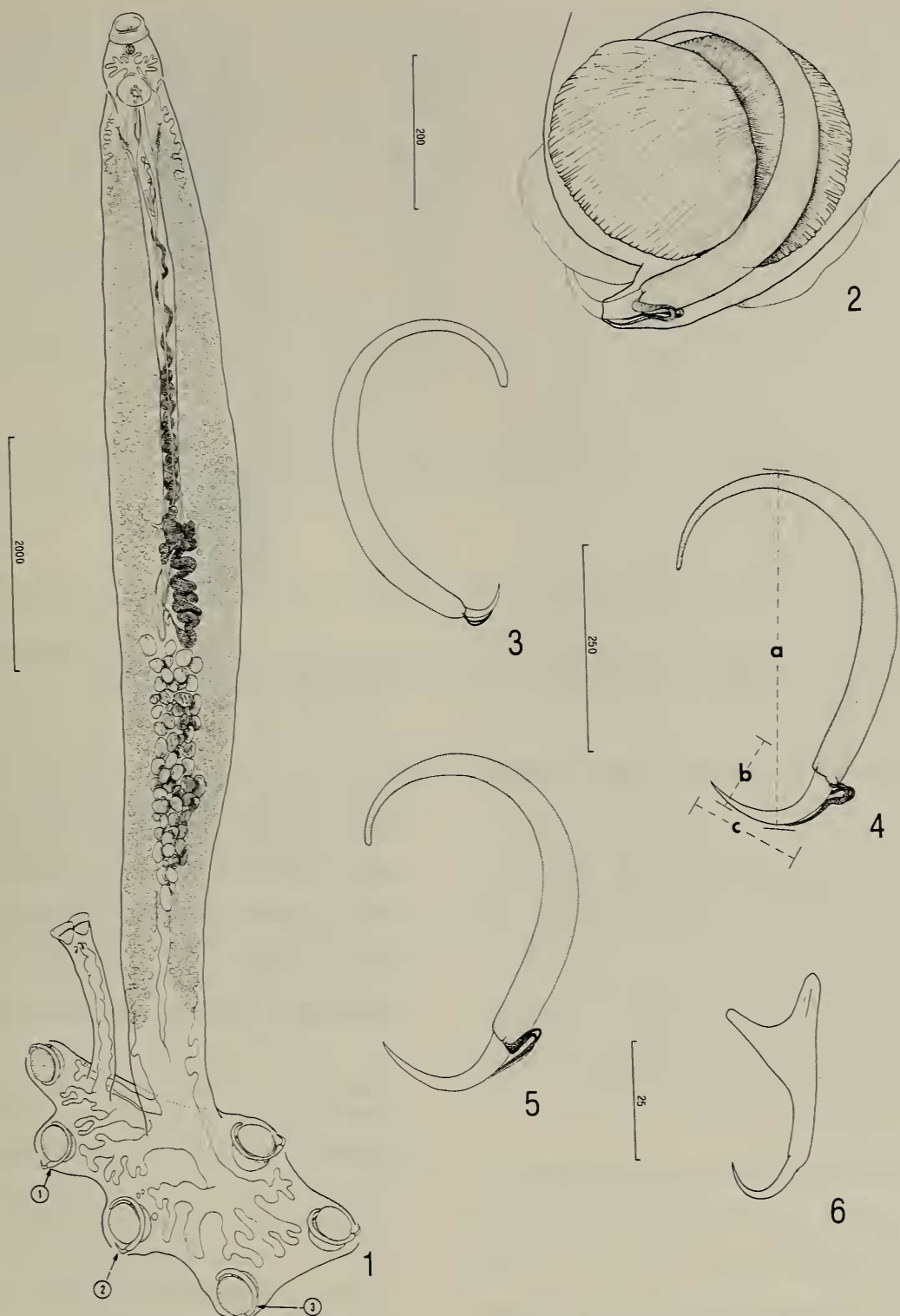
Remarks.—Suriano & Incorvaia (1982) treat this species under three names: *C. marplatensis*, *C. callorhynchi*, and *C. callorhynchy*. The latter two apparently represent typographic and/or editing errors. It is apparent that these authors were not referring to other species of *Callorhynchocotyle* since they consider the genus monotypic. Clearly, the authors intended the name of their new species to be *C. marplatensis* which is considered herein as the valid name of the taxon.

Based on the holotype and voucher specimens, it is evident that Suriano & Incorvaia (1982) confused polarity of the dorsoventral axis in their specimens. This is supported by their illustration of the holotype presented as a dorsal rather than a ventral view as the specimen is mounted. Consequently, the sinistrodextral orientations of features of the parasite are reversed in the original description. Also contrary to the original description, the haptoral appendix originates from the dorsal surface of the haptor, and the genitointestinal canal, uterus and vitelline commissure are dorsal to the ovary.

The holotype is a damaged, excessively flattened, and contracted specimen. One of the haptoral suckers and its sclerite are torn away (not shown in fig. 1 of Suriano & Incorvaia 1982). Apparently, these original authors added the missing sucker to their drawing of the holotype based on the presence of six suckers in other specimens of their collection. This, however, resulted in their apparent confusion of a damaged mus-

Table 1.—Measurements (in micrometers) of *Callorhynchocotyle* species.

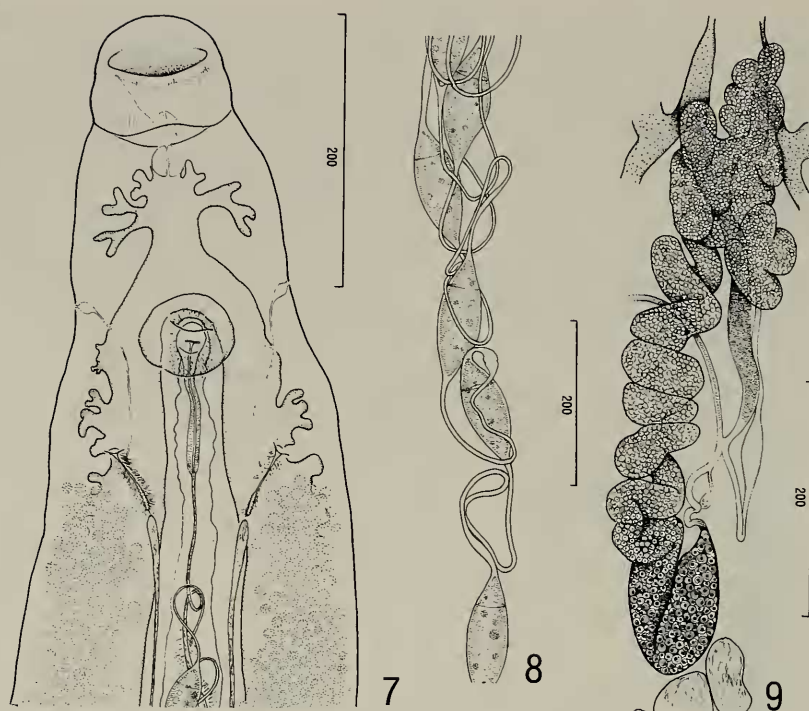
	<i>C. callorhynchi</i> (n = 2)	<i>C. marplatensis</i> (n = 17)	<i>C. amatoï</i> (n = 8)
Body length	6052 (4995–7109)	9989 (7200–12,430)	7091 (5329–8474)
Body width	845 (669–1021)	939 (649–1217)	989 (706–1316)
Haptor			
Length	2007	2719 (2051–3324)	1959 (1451–2482)
Width	—	1596 (1331–1918)	1201 (755–1639)
Oral sucker			
Width	284 (248–322)	302 (231–362)	252 (191–356)
Pharynx			
Length	72	71 (58–83)	79 (69–91)
Width	64 (56–72)	71 (60–78)	70 (62–89)
Genital sucker			
Diameter	—	205 (153–262)	—
Egg			
Length	152 (136–168)	145 (125–193)	156 (144–169)
Width	58 (53–62)	59 (52–66)	54 (48–60)
Ovary			
Length	639 (459–818)	1147 (816–1505)	859 (651–971)
Distal vagina	276	180 (136–203)	350 (269–432)
Appendix			
Length	2104 (1844–2363)	1397 (1275–1637)	1108 (674–1429)
Width	997 (972–1021)	256 (149–350)	850 (541–1206)
Appendix sucker			
Length	289	181 (164–204)	272 (236–320)
Width	109	195 (154–190)	144 (102–185)
Anchor			
Length	194 (186–203)	190 (144–210)	182 (172–195)
Base width	—	87 (72–98)	85 (83–87)
Diameter of haptoral sucker			
Pair 1	274 (258–290)	305 (243–346)	267 (188–362)
Pair 2	362	365 (270–419)	332 (232–435)
Pair 3	319	345 (267–393)	310 (217–415)
Sclerite #1			
Total	283 (281–285)	353 (289–385)	297 (239–355)
Shaft	31–32	33 (27–44)	20 (18–22)
Point	42 (39–45)	50 (42–57)	37 (36–39)
Sclerite #2			
Total	362	460 (362–499)	412 (347–452)
Shaft	88	76 (59–92)	54 (46–70)
Point	106	117 (95–141)	83 (70–98)
Sclerite #3			
Total	351	454 (382–512)	408 (332–469)
Shaft	84 (83–86)	80 (65–92)	56 (45–66)
Point	123–124	129 (99–145)	92 (86–98)



Figs. 1–6. *Callorhynchocotyle marplatensis*: 1, Whole mount (ventral); 2, Sucker-sclerite complex; 3, Sclerite of complex 1; 4, Sclerite of complex 2; 5, Sclerite of complex 3; 6, Anchor. All figures are reproduced to respective scales except Figs. 3, 4, 5 are drawn to the 250-micrometer scale. Circled numbers identify sucker-sclerite pairs in the haptor. Fig. 4 shows measurements taken from each sclerite (Table 1): a = total length; b = shaft length; c = point length.

cle as a haptoral extension of the gut. In the holotype the gut is not visible in the haptor, although the structure depicted as gut (the muscle which apparently served the lost sucker) is evident. Our specimens show that

the esophagus has lateral diverticulae, the caeca are confluent posterior to the testes, and the intestine extends into the haptor with branches, one of which occurs in the haptoral appendix.



Figs. 7–9. *Callorhynchocotyle marplatensis*: 7, Ventral view of anterior end; 8, Egg chain from uterus; 9, Female reproductive system (ventral). Figures are to respective 200-micrometer scales.

*Callorhynchocotyle amato*i, new species
Figs. 10c, 11c, 12c

Synonyms.—*Squalonchocotyle callorhynchi* Manter, 1955 (part); *Erpocotyle callorhynchi* (Manter, 1955) Yamaguti, 1963 (part).

Host.—*Callorhinchus milii* Bory.

Type locality.—Coast of New Zealand.

Specimens studied.—Holotype, USNM 37448; seven paratypes, USNM 71197, HWML 1442.

Description (measurements in Table 1).—Genital sucker absent; 94–120 testes. Papillae present on rim and inner wall of oral, haptoral suckers. Sucker sclerite 2, 3 with short point; indistinct angle formed at union of shaft and point of sclerite 3; sclerite 1 with delicate point, short shaft. Anchor with wide base, short roots, medially curved shaft, short point.

Etymology.—This species is named for Dr. Jose Felipe R. Amato, Universidade Federal Rural do Rio de Janeiro, in recognition of his contributions in marine parasitology.

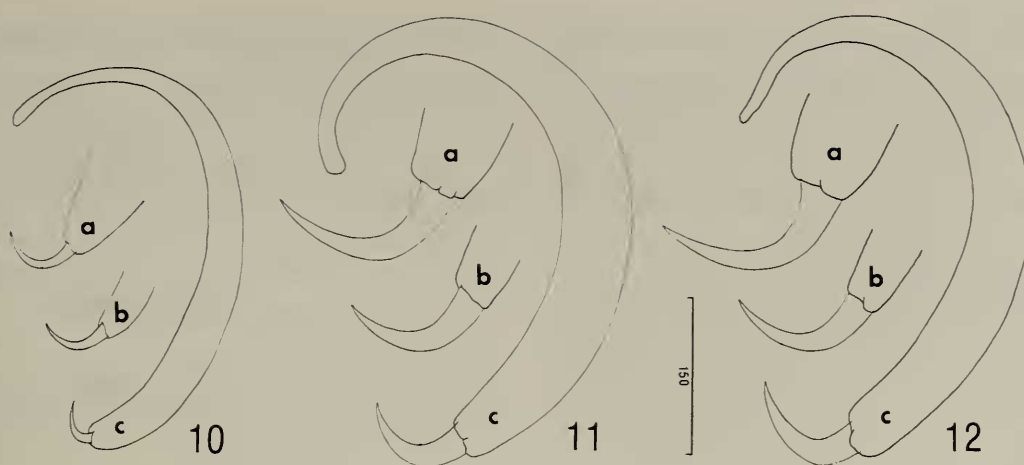
Remarks.—Our study of the type specimens of *Squalonchocotyle callorhynchi*

Manter, 1955, and specimens identified as *Erpocotyle callorhynchi* (Manter, 1955) by Dillon & Hargis (1968) revealed that those from *Callorhinchus milii* from New Zealand represent a species distinct from that occurring on *C. capensis*. Although Dillon & Hargis (1968) recognized the morphologic differences between these specimens, they did not question their conspecificity.

Since the holotype of *Squalonchocotyle callorhynchi* is a specimen collected from the gills of *Callorhinchus capensis* captured off South Africa, *Callorhynchocotyle amato*i is proposed for those specimens from *Callorhinchus milii* from New Zealand. *Callorhynchocotyle amato*i differs from *C. callorhynchi* and *C. marplatensis* by having shorter shafts and points of all sucker sclerites (Fig. 13) and an indistinct angle between the point and shaft of sclerite 3 (Fig. 12c).

Callorhynchocotyle callorhynchi
(Manter, 1955), new combination
Figs. 10b, 11b, 12b

Synonyms.—*Squalonchocotyle callorhynchi* Manter, 1955 (part); *Erpocotyle cal-*



Figs. 10–12. Sclerites of *Callorhynchocotyle* spp.: 10, Sclerite of complex 1; 11, Sclerite of complex 2; 12, Sclerite of complex 3. a = *C. marplatensis*; b = *C. callorhynchi*; c = *C. amatoii*. All figures are drawn to the same scale.

lorhynchi (Manter, 1955) Yamaguti, 1963 (part).

Host.—*Callorhinchus capensis* Dumeril.

Type locality.—Coast of South Africa.

Specimens studied.—Holotype, paratype, USNM 37447.

Description (measurements in Table 1).—Genital sucker absent, 96–98 testes. Papillae present on rim and inner wall of oral, haptoral suckers. Sucker sclerite 1, 2, 3 with short point, moderate shaft, evenly curved shaft and point. Anchor with wide base, short roots, medially curved shaft, short point.

Remarks.—*Callorhynchocotyle callorhynchi* is most similar to *C. marplatensis*, from which it differs by possessing papillae on the rim and inner walls of the oral and haptoral suckers, a comparatively long distal portion of the vaginae, absence of a genital sucker, and by the comparative morphology of the shaft and point of the sucker sclerites (Figs. 10–12).

Discussion

Callorhynchocotyle was proposed by Suriano & Incorvaia (1982) to accommodate *C. marplatensis*. Among characters used to define the genus was the presence of marginal vaginal pores. Examination of the holotype (MP 12) of *C. marplatensis* and vouchers collected during the present study

shows that the vaginae actually open submarginally as they do in members of all other hexabothriid genera. Apparently Suriano and Incorvaia (1982) confused the lateral excretory pores as the vaginal apertures.

Other characters used by Suriano and Incorvaia (1982) for diagnosis of the genus include: 1) an asymmetric haptor with 6 suckers armed with sclerites of different sizes, 2) a sac-like seminal receptacle, 3) parallel bilateral vaginae, 4) an unarmed cirrus, 5) a smooth ootype, and 6) the absence of a glandular region of the cirrus. Of these, only the absence of a glandular region of the cirrus is unique for the genus. In *Callo-*

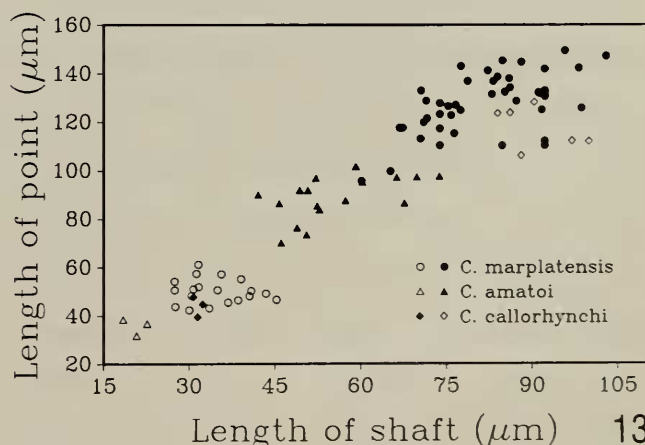


Fig. 13. Scatter diagram of length of point versus length of shaft of the sclerite for three species of *Callorhynchocotyle*. The left column of symbols of the legend refers to sclerite 1 of respective species; the second column refers to sclerites 2, 3 of the respective species.

rhynchocotyle, the glandular region of the cirrus is apparently replaced by an extensive glandular segment of the vas deferens. These characters may represent an example of compensatory change (evolution) as defined by Brooks and Wiley (1986).

Other hexabothriid genera with asymmetric haptors include *Heteronchocotyle* Brooks, 1934, *Paraheteronchocotyle* Mayes, Brooks and Thorson, 1981, *Epicotyle* Euzet & Maillard, 1974, *Rhinobatonchocotyle* Doran, 1953, and *Neonchocotyle* Ktari & Maillard, 1972. The haptor of *Callorhynchocotyle* most closely resembles that of *Neonchocotyle* in that the asymmetry results from the apparent migration of one sucker-sclerite complex to the opposite side of the haptor. Further, the appendix does not originate from the midline which adds to haptoral asymmetry.

In addition to the above, *Callorhynchocotyle* is distinguished from other hexabothriid genera by the combined presence of the following characters: presence of a bulbous distal cirrus, a dorsal instead of terminal haptoral appendix, and a terminal glandulomuscular portion of the vagina.

Hargis (1955) reported that the genitointestinal canal of *Heteronchocotyle leucas* Hargis, 1955 (Hexabothriidae), apparently joined the left intestinal caecum and suggested that this condition was rare among the higher Monogenea. In individual specimens of *Callorhynchocotyle*, the genitointestinal canal was found to be united to the intestinal caecum which corresponded to the respective position of the ovary, i.e., if the ovary occurred to the right of the body midline (Fig. 9) the genitointestinal canal united with the right caecum and conversely with the left caecum if the ovary occurred to the left of the body midline (Fig. 1). Similarly, the haptoral appendix and the migrated sucker-sclerite complex occur either to the left or right of the longitudinal haptoral axis. However, there was no correlation between the asymmetry of the haptor and the location of the ovary. The sinistral or dextral

position of the ovary and genitointestinal canal and the position of the appendix and sucker-sclerite in the haptor are examples of intraspecific variation and do not constitute generic characteristics for the Hexabothriidae.

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lorhynchus* (Linne, 1758) Garman, 1904 (Pisces: Holocephali) de la region costera de Mar del Plata.—Comunicaciones del Museo Argentino de Ciencias Naturales Bernardino Rivadavia e Instituto Nacional de Investigacion de las Ciencias Naturales 2:19–32.

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